



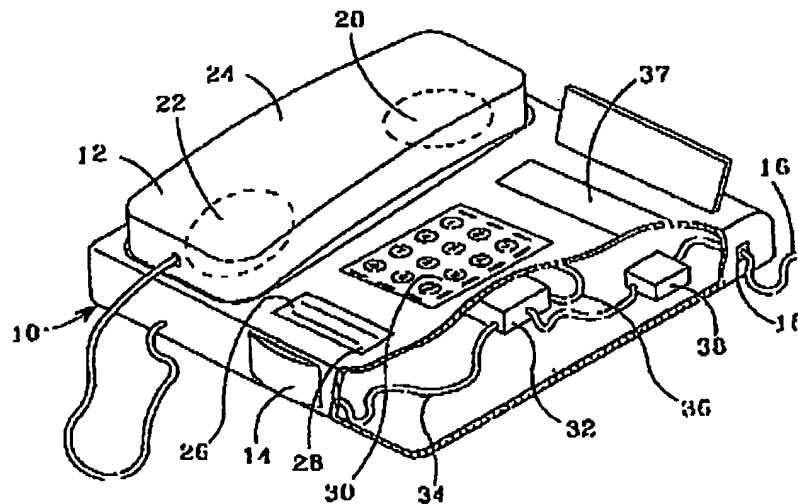
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/CA97/00413 (22) International Filing Date: 6 June 1997 (06.06.97) (30) Priority Data: 08/660,457 7 June 1996 (07.06.96) US (71) Applicant: TELALERT, INC. [CA/CA]; Suite 500, 933 - 17 Avenue S.W., Calgary, Alberta T2T 5R6 (CA). (72) Inventors: HILLS, Michael; 100 Strathearn Rise S.W., Calgary, Alberta T3H 1R6 (CA). VERHOORN, Garry; R.R. 1, Site 15, Box 11, Strathmore, Alberta T1P 1J6 (CA). ISTEAD, Robert, E.; 527 Croke Newell Cr. S.E., Calgary, Alberta T2J 3L7 (CA). (74) Agents: GRAHAM, Anthony, J. et al.; Scott & Aylen, Suite 1000, 60 Queen Street, Ottawa, Ontario K1P 5Y7 (CA).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  Published Without international search report and to be republished upon receipt of that report.

(54) Title: PROGRAMMED TELEPHONE SECURITY SYSTEM



## (57) Abstract

A programmed telephone security system for engagement with a telephone line. The system is engaged with a telephone attached to a conventional hard wire or wireless telephone line. A sensor detects a selected condition and generates a sensor signal responding to the condition. A controller receives the sensor signal and transmits an alarm signal to the telephone line. More than one condition can be detected by a sensor or array of sensors, and the controller can address the alarm signal to more than one receiver engaged with the telephone line. The controller can be remotely programmed to change certain functions such as the designated address for the alarm signals. Additionally, the controller can initiate a speaker phone in the telephone to transmit an audio signal, or to open two-way audio communication. The sensor can detect unauthorized intruders, fire or smoke, panic button signals, temperature deviations, carbon dioxide, medical conditions, unsupervised movement in swimming pools, and other conditions.

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## PROGRAMMED TELEPHONE SECURITY SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates to the field of security devices for detecting hazardous conditions and for transmitting a signal representing such conditions. More particularly, the invention relates to a programmed telephone security system for detecting one or more conditions, for generating a signal responsive to such conditions, and for interactively transmitting the signal to selected receivers.

Conventional alarm signals detect unauthorized entry, fire, smoke, unsupervised pool activity, medical emergency and other hazardous conditions. Such alarm systems typically detect a single hazardous condition and report such condition to a single receiver. Intruder alarm systems generate an audible alarm and transmit a signal to police or to a private security company switchboard. Fire and smoke alarm systems transmit a signal to a community response switchboard or other response service. If the response service does not or cannot timely respond to the hazardous condition, conventional alarm systems do not notify other entities of the hazardous condition. Accordingly, backup response is not provided if the primary response service fails.

Conventional alarm systems typically require expensive hardware installations linked with wiring through walls and ceilings of a house or other structure. Such alarms are obtrusive, are easily identified and disconnected by intruders, and are not easily moved from one location to another. Alarm

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systems require monthly payments for alarm monitoring services and require expensive surcharges for false alarms. The response time for surveillance services is highly variable, and such services may not provide the most effective response to a particular hazardous condition.

Although conventional telephones can provide access to emergency personnel during an unauthorized entry, fire, or medical emergency, telephones require physical operation to function. In exigent situations, the nature of the emergency may effectively preclude access to a telephone or may render a victim helpless. Additionally, an emergency condition such as fire may occur when no person is present to detect the fire.

Conventional alarm systems are not sufficiently adaptable to meet certain security requirements, are not easily moved from one location to another, and do not effectively respond to a variety of hazardous conditions. Accordingly, there is a need for a system which overcomes the limitations of existing alarm technology.

## SUMMARY OF THE INVENTION

The invention provides a unique apparatus for engagement with a telephone line to transmit a signal responsive to a selected condition. The apparatus includes a housing, a telephone engaged with the housing and with the telephone line for receiving and for transmitting audio signals, a sensor for detecting a selected condition and for generating a sensor

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signal, and a controller engaged with the sensor for receiving the sensor signal, for generating an alarm signal, and for transmitting the alarm signal to the telephone line.

In different embodiments of the invention, the sensor can  
5 comprise a motion detector, panic button, fire detector, temperature detector, carbon dioxide detector or other detector capable of detecting a particular condition. The controller can receive and distinguish signals from different sensors and can transmit different alarm signals to one or more selected  
10 telephone receivers. The controller can be programmable on site or remotely to modify the generation and transmittal of an alarm signal. The controller can be engaged with sensors and with the telephone line through a wire or through wireless transmission. The controller can activate a speaker phone within the telephone  
15 to generate audio signals for transmission through the telephone line or to establish two-way communication between the speaker phone and an outside audio source.

#### BRIEF DESCRIPTION OF THE DRAWINGS

20 Figure 1 illustrates a partial sectional view for one embodiment of the invention.

Figure 2 illustrates one embodiment of a keypad suitable for controlling the operation of a telephone and a controller.

Figure 3 illustrates a schematic diagram showing remote  
25 sensors in cooperation with a controller for transmitting alarm signals to multiple receivers.

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DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a unique alarm system for detecting one or more conditions and for transmitting a signal representative of such conditions through a telephone line to one or more receivers. The system is programmable to provide program flexibility, portability, and unique functions not provided by conventional alarm systems.

Figure 1 illustrates one embodiment of the invention wherein housing 10 is shaped as a conventional desktop telephone. Although the particular shape of housing 10 is independent of the invention's functional aspects, housing can take different forms suitable for selected design objectives. By configuring housing 10 as a conventional telephone, the security functions of the invention described below are disguised from unauthorized persons. Additionally, the integration of the invention into a conventional telephone shape does not introduce new equipment into a room or other space.

Housing 10 is engaged with telephone 12 and sensor 14.

"Telephone" is defined as any component performing the function of a telephone or telephony circuit. Telephone 12 can take different forms and includes any instrument that directly modulates carrier waves with voice or other audio signals to be transmitted and that directly reconverts received waves into audio signals. The audio signals can be audible noises detected by telephone 12 or can comprise infrared transmissions or

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electrical or electronic tones and signals conveyed to telephone 12. Telephone 12 cooperates with telephone line 16. "Telephone line" as defined herein can comprise any form of hard wire or wireless transmission path suitable for electrical transmission of sound or audio signals. Telephone line 16 includes analog telephone lines, conventional POTS lines, International Standard Data Network (ISDN) lines or other digital telephony lines, fiber optics, and infrared or radio frequency transmission paths.

Telephone 12 includes jack 18 for connection to telephone line 16, handset speaker 20 for converting audio signals from telephone line 16 into audible sounds, transmitter 22 for converting audio signals for transmission through telephone line 16, handset handle 24 for containing handset speaker 20 and transmitter 22, and speaker phone assembly 26 having speaker 28 for bypassing handle 24 to convert audible signals and source signals between telephone line 16 and a user. Telephone 12 also includes keypad 30 for generating address signals for communication with other telephones (not shown) communicating with telephone line 16. Keypad 30 also permits operating instructions to be transmitted to controller 32 engaged with sensor 14 and with telephone 12 for programming or controlling controller 32.

Sensor 14 is uniquely engaged with controller 32 to detect one or more selected events or conditions. Although sensor 14 is illustrated in attachment with housing 10, sensor 14 can comprise a single unit or array of individual units enclosed within

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housing 10 or located distant from housing 10. Sensor 14 can take different forms and can comprise a motion detector such as an infrared motion detector, a fire detector, a smoke detector, a temperature detector to identify temperatures higher or lower than a selected degree, a carbon dioxide or carbon monoxide detector, a touch or voice sensitive panic button, or an unauthorized person or intruder detector for sensing door and window movement, breakage, or screen rupture. In other embodiments of the invention, sensor 14 can detect unauthorized use of a swimming pool and can monitor physical conditions in a medical patient.

Sensor 14 generates a sensor signal responsive to the detected condition, and transmits this sensor signal to controller 32 for processing. Controller 32 manages the receipt, storage, signal generation, and transmittal of signals identified herein as "alarm signals". Controller 32 is engaged with sensor 14 through hard wire 34. In alternative embodiments of the invention where one or more auxiliary sensors 14 are located remotely from housing 10, controller 32 can be engaged with sensor 14 through infrared, optical, radio transmission or similar signal communication equipment.

Controller 32 is engaged with telephone line 16 to accomplish different functions. Audio signals can be transmitted to controller 32 through telephone line 16, and controller 32 can communicate alarm signals to telephone line 16. In a preferred embodiment of the invention, controller 32 is directly engaged



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with telephone 12 through wire 36 or other data communication paths. Display 37 can show signals, feedback, or other selected information. Controller can activate speaker phone assembly 26 and could accept voice activated instructions through telephone 5 12. Additionally, controller 32 can be engaged with keypad 30 to permit manual programming and reprogramming of various operating functions performed by controller 32 as described below.

Controller 32 provides a unique centralized or "hub" function for the transmission and processing of data. Controller 10 32 receives sensor signals from one or more sensors 14 and performs different processing functions. Controller 32 can classify incoming sensor signals to priortize or to selectively store such information, and can be preprogrammed to generate and transmit alarm signals to selected receiving units. For example, 15 controller 32 can be programmed to send the first alarm to a selected receiving unit such as a mobile or portable telephone or pager unit, thereby providing the first alarm to the controller 32 owner. Alternatively, the first alarm could be transmitted to a neighbor, friend, relative, or emergency response service. The 20 hierarchy or receiving entities can be preprogrammed or can be modified at any time.

Controller 32 provides extraordinary flexibility in programming the sequence of alarm signal transmission. Controller 32 provides multifunctional services not available in 25 conventional alarm systems. For example, the alarm signal generated by controller 32 can require a return signal from the

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receiver indicating the receipt and acknowledgement of the alarm signal. This feature does not recognize passive receivers such as telephone answering machines. If such acknowledgement is received by controller 32, no further alarm signals are  
- 5 transmitted. If such acknowledgement is not received within a selected time period, controller 32 immediately transmits an alarm signal to the next priority receiver. This feature of the invention permits screening of the alarm signal for false alarms, thereby reducing the economic cost and disruption of false alarm  
10 responses. Alternatively, controller 32 can transmit alarm signals to all programmed receivers, or can be interactively commanded by the first receiver to transmit an alarm signal to a particular receiver in communication with telephone line 16.

Although controller 32 and sensor 14 are illustrated as  
15 different components, it is possible to use a single component merging some or all of the functions performed by controller 32 and sensor 14. Although these components are described herein as separate components, a single instrument for detecting a condition and for transmitting an alarm signal through telephone  
20 line 16 provides an equivalent function to that provided by controller 32 and sensor 14, and would comprise an equivalent apparatus for purposes of the invention.

Controller 32 can be connected to the power source typically provided through telephone line 16, or to a conventional  
25 alternating current source. Controller 32 can include memory storage capability provided by an EE-PROM or with another

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electronic storage structure connected to battery 38. Battery 38 can provide standby power in the event of a power outage or relocation of housing 10. Battery 38 can also provide power to operate sensor 14 or to operate auxiliary equipment engaged with  
5 controller 32.

In operation, controller 32 activates sensor 14 to monitor the normal environmental state. When a selected condition such as intruder movement or a fire occurs, sensor 14 detects the condition and generates a sensor signal for transmission to  
10 controller 32. Controller 32 receives the sensor signal and generates an alarm signal which is transmitted to telephone line 16 through telephone 12. The form of such alarm signal can be prefaced with one or more telephone numbers to be accessed through telephone line 16, and can subsequently include a signal  
15 segment identifying certain information describing the condition detected by sensor 14. Although the invention is operable with transmitting the alarm number to a single receiving telephone number, two or more receiving telephone numbers can be accessed in sequential or random order as previously described to provide  
20 descriptive information regarding the alarm signal and alarm source. Alternatively, data can be multiplexed to create concurrent transmission of signals.

Referring to Figure 2, one embodiment of keypad 30 is illustrated. Keypad 30 includes conventional telephone keys  
25 identified by "\*", "#", numerals "1 - 0", "Line 1", "Line 2" and "Hold" and further includes arm key 40, mute key 42, program key

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44, redial key 46, store key 48, recall key 50, and speaker key 52. From keypad 30, controller 32 can be operated to perform different functions. Feedback from controller 32 to the user can be transmitted with an LED display or a digital audio message.

- 5 Controller 32 can be programmed with password protection to prevent unauthorized entry. Such password protection effectively provides a lock for controller 32. When controller 32 is set in an "alarm state" representing the readiness of sensor 14 to detect the selected condition, a master password (default 6666) will clear and disarm all alarms, and a "disarm" password (default 3333) will clear and disarm any active alarms but will not change inactive armed alarms. A "reset" password (default 7777) can clear active alarms until the next select condition is sensed and a signal to controller 32 is generated by sensor 14.
- 10
- 15 When controller 32 is not in an alarm state, the respective feature button 54 can be pushed and the master password can be entered to set operating values.

- To set the master password or to change from the default password, press (#0#) and controller 32 will request the entry of a new password or the repeat of the existing password. To change from the disarm default password to to set a new disarm password, press (#1#) and controller 32 will request the entry of a new password or the repeat of the existing disarm password. To set a new reset password or to change from the reset default password,
- 20
- 25 press (#2#) and controller 32 will request the entry of a new password or the repeat of the existing password.

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Keypad 30 can activate controller 32 to selectively control one or more alarm functions. To disable or turn off a particular alarm function, press (#3#), then another number associated with a particular alarm function, and then feature button 54 to save the selection. Representative numbers can selectively disarm alarms for fire, intruder, medical, panic and other desired functions. To enable or turn on a particular alarm function, press (#4#), then the number associated with the desired function, then feature button 54 to save the selection.

Controller 32 can selectively delay the transmittal of an alarm signal. To set the entry delay time for the alarm signal to telephone wire 16, press (#5#), then the selected time in mmss (one minute equals "100" and 30 seconds equals "30"), then press feature button 54 to save. To set the exit delay time representative of the operating time after controller 32 is armed, press (#6#), then the selected time in mmss, then feature button 54.

To record a custom message to be repeated by controller 32, press (#7#) and feature button 54 to begin a recording function by controller 32. To stop the recording function, feature button 54 is pressed a second time. LED 56 identifies the time available for such recorded message, and the recorded message can be replayed by pressing (#8#).

Controller 32 can be engaged with speaker or horn 58 for producing an audible warning sound. To delay the sounding of horn 58 after sensor 14 detects a condition, and after controller

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32 has transmitted an alarm signal to a selected number of remote telephone receivers, a default program can be activated by pressing (#9#). Alternatively, horn 58 can be immediately set to produce an audible warning sound by pressing (#11#).

- 5           Controller 32 can be armed by pressing (#12#) to set all alarms to be activated and to automatically exit the feature setting routine. To disarm controller 32 so that all alarm inputs are disconnected press (#13#).

- Controller 32 can also be operated to add additional  
10 functions during the sounding of an alarm and the transmitted alarm signal. Controller 32 is connected to speaker 28 so that pressing (\*) permits a person to hear audible sounds detected by speaker 28 during the operation of a respective alarm.  
Similarly, pressing (#) activates speaker phone assembly 26 to  
15 permit two-way transmission of audible sounds during the operation of a respective alarm. This feature permits a response entity to monitor environmental conditions adjacent housing 10, and to establish two-way communication with persons adjacent housing 10.

- 20           Keypad 30 also permits the operation of functions previously mentioned. To operate speaker phone assembly 26 when receiver handle 24 contacts housing 10, speaker key 52 can be pushed to enable speaker phone assembly 26 while disabling receiver 20 and transmitter 22. When receiver handle 24 is not in contact with  
25 housing 10, alternate pressing of speaker key 52 can correlatively alternate between speaker phone assembly 26

operation and the combination of receiver 20 and transmitter 22. When speaker phone assembly 26 is used, removing receiver handle 24 from contact with housing 10 converts signal transmission from speaker assembly 26 to receiver 20 and transmitter 22.

5 Controller 32 can be designed to store a select quantity of telephone numbers for receiving transmission of alarm signals from different sensors 14, and for transmitting alarm signals to different receiver addresses. The quantity and address for different alarm signals can be selected and modified as  
10 appropriate. For example, fire alarm signals can be directed to a neighbor or local fire station. Intruder alarm signals can be directed to a neighbor or surveillance service. Building temperatures alarm signals for detecting freezing weather or failure of cooling equipment can be directed to a neighbor or  
15 maintenance personnel. The invention uniquely provides extraordinary flexibility in customizing an alarm to the special needs of a particular application.

To store selected telephone numbers suitable for receiving alarm signals, press store key 48, the digit location for the  
20 appropriate number, and repeat this two step sequence. To recall a telephone number from storage within controller 32, press recall key 50 and the appropriate digit corresponding to the selected number. Mute key 42 turns off speaker phone assembly 26 and receiver 20 when pressed.

25 Figure 3 illustrates a schematic view of the invention wherein telephone 60 is engaged with controller 62. First sensor

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64, second sensor 66, and third sensor 68 detect the same or different hazardous conditions, are remotely located from controller 62, and are capable of transmitting sensor signals through infrared or radio frequency (RF) receiver 70 through hard  
5 wires or through wireless transmission. Each sensor can have a unique address within controller 62 to reduce crosstalk. In this embodiment of the invention, multiple sensors such as 64, 66 and 68 can be strategically placed to maximize the effectiveness of such sensors in identifying a selected condition. Smoke detector  
10 sensor 64 can be placed on a ceiling to detect rising smoke particles, intruder detector sensor 66 can be positioned on window screens or glass or proximate to other entry points, and panic button or similar sensor 68 can be positioned near bathrooms and stairways.

15 In other embodiments of the invention, panic button 70 can comprise a portable touch or voice activated sensor that can be carried as a keychain, necklace, bracelet or other portable unit. Panic button 70 can comprise a single switch or several switches suitable for generating different commands for the sensor  
20 signals. By providing the capability for wireless reception from multiple sensors, controller 62 can effectively monitor numerous conditions and can generate alarm signals for transmission as appropriate.

Portable switch 72 can control the arming and disarming of  
25 controller 62, and permits an intruder alarm to be bypassed to permit authorized entry. Alternatively, controller 62 can have a



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time delay function permitting physical access to keypad 30 so that an intruder alarm can be disarmed, while other alarm functions such as a fire alarm can automatically override such intruder alarm delay function so that a fire alarm is not  
5 delayed.

The invention automatically dials a selected quantity of telephone numbers through telephone line 16 to alert selected persons or entities to a detected emergency or other type of condition or event. Telephone line 16 can be engaged with a  
10 public switch telephone network (PSTN) 74 accessible by multiple remote telephone receivers identified as 76, 78 and 80. The receiving person or entity at the remote telephone receivers can detect audible sounds detected by speaker phone assembly 26 so that additional response action can be made. The invention  
15 reduces the possibility of false alarms, is highly portable between rooms and from one structure to another, is less expensive than conventional alarm systems, and provides a highly customized response capability not available in conventional alarm systems.

20 The invention facilitates adjustments to the alarm system in person or through remote transmission of signals through telephone lines. Unauthorized access to the controller is prevented with password coded routines, and the security of the system is verifiable.

25 Although the invention has been described in terms of certain preferred embodiments, it will be apparent to those of

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ordinary skill in the art that modifications and improvements can be made to the inventive concepts herein without departing from the scope of the invention. The embodiments shown herein are merely illustrative of the inventive concepts and should not be  
5 interpreted as limiting the scope of the invention.

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1 WHAT IS CLAIMED IS:

2

3 1. An apparatus for engagement with a telephone line to  
4 transmit a signal responsive to a condition, comprising:

5 a housing;

6 a telephone engaged with said housing and with the telephone  
7 line for receiving and for transmitting audio signals;

8 a sensor for detecting a selected condition and for  
9 generating a sensor signal in response to the selected condition;

10 and

11 a controller engaged with said sensor for receiving the  
12 sensor signal, for generating a programmed alarm signal, and for  
13 transmitting the alarm signal to the telephone line.

14

15 2. An apparatus as recited in Claim 1, wherein said sensor  
16 comprises a motion detector for detecting movement and for  
17 generating a sensor signal responsive to such movement.

18

19 3. An apparatus as recited in Claim 2, wherein said motion  
20 detector comprises an infrared motion detector.

21

22 4. An apparatus as recited in Claim 1, wherein said  
23 controller is capable of transmitting the alarm signal to a  
24 selected telephone receiver engaged with the telephone line.

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27 5. An apparatus as recited in Claim 4, wherein said  
28 controller is capable of sequentially transmitting the alarm  
29 signal to at least two selected telephone receivers.  
30

31 6. An apparatus as recited in Claim 1, wherein said  
32 controller is remotely programmable with audio signals to modify  
33 the alarm signal generated by said controller in response to the  
34 sensor signal.  
35

36 7. An apparatus as recited in Claim 1, further comprising a  
37 second sensor engaged with said controller for detecting a second  
38 selected condition and for generating a second selected sensor  
39 signal for transmission to said controller.  
40

41 8. An apparatus as recited in Claim 1, wherein said  
42 telephone includes a speaker phone for generating audio signals  
43 for transmission through the telephone line, and wherein said  
44 controller is capable of transmitting the alarm signal through  
45 the telephone line to engage a remote telephone receiver, and is  
46 capable of activating said speaker phone to transmit audio  
47 signals to the remote telephone receiver.  
48

49 9. An apparatus as recited in Claim 8, wherein said  
50 controller is activatable from the remote telephone receiver to  
51 establish two-way source signal communication between said  
52 speaker phone and the remote telephone receiver.

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53

54 10. An apparatus as recited in Claim 1, wherein said sensor  
55 comprises a fire detector.

56

57 11. An apparatus as recited in Claim 1, wherein said sensor  
58 comprises a temperature detector.

59

60 12. An apparatus as recited in Claim 1, wherein said sensor  
61 comprises a carbon dioxide detector.

62

63 13. An apparatus as recited in Claim 1, wherein said sensor  
64 comprises a panic button.

65

66 14. An apparatus attachable to a telephone line for  
67 transmitting a signal responsive to a condition, comprising:

68 a housing;

69 a telephone attached to said housing and engaged with the  
70 telephone line for receiving and for transmitting audio signals;

71 a sensor attached to said housing for detecting a selected  
72 condition and for generating a sensor signal in response to the  
73 selected condition; and

74 a controller engaged with said sensor for receiving the  
75 sensor signal, for generating a programmed alarm signal and for  
76 transmitting the alarm signal to the telephone line, wherein said  
77 controller is programmable to modify the alarm signal transmitted  
78 to the telephone line.

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79 15. An apparatus as recited in Claim 14, wherein said  
80 controller is capable of transmitting the alarm signal in a  
81 selected sequence to at least two telephone numbers.

82

83 16. An apparatus as recited in Claim 14, wherein said  
84 controller is remotely programmable from audio signals  
85 transmitted through the telephone line.

86

87 17. An apparatus as recited in Claim 14, further comprising  
88 a second sensor attached to said housing for detecting a second  
89 selected condition, and for generating a second sensor signal for  
90 transmittal to said controller.

91

92 18. An apparatus as recited in Claim 14, further comprising  
93 an alarm engaged with said controller for receiving the alarm  
94 signal and for generating an audible warning.

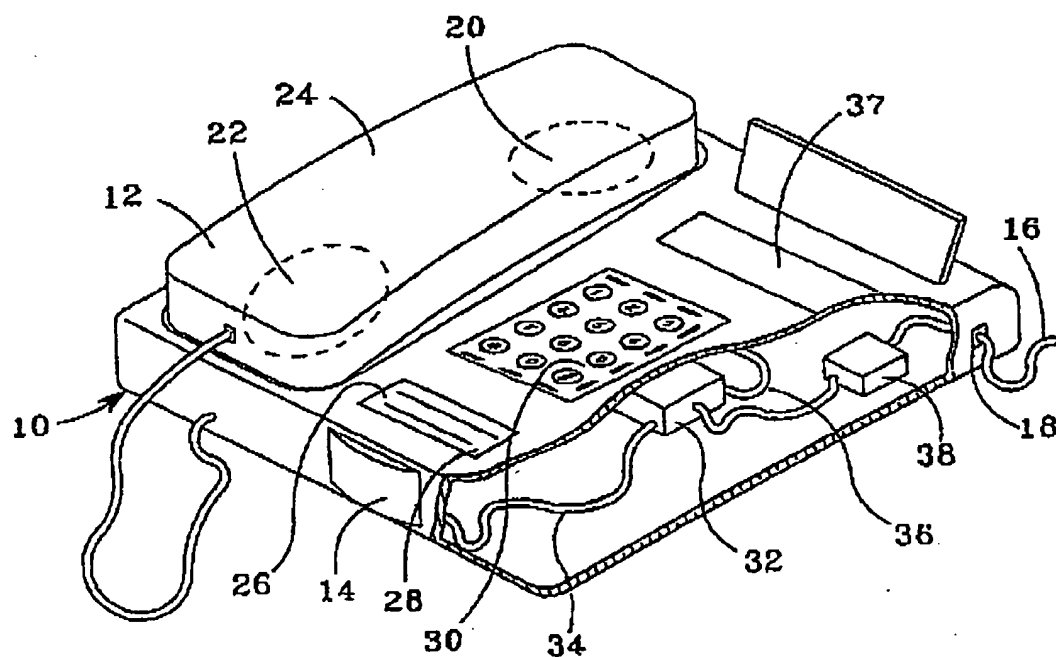
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96 19. An apparatus as recited in Claim 14, wherein said  
97 controller is detachable from the telephone line and is  
98 reattachable to another telephone line, and wherein said  
99 controller is capable of retaining the programmed alarm signal  
100 during such detachment and reattachment.

101

102 20. An apparatus as recited in Claim 14, wherein said  
103 controller further includes a lock to prevent unauthorized  
104 programming of the controller.

Fig. 1



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Fig. 2

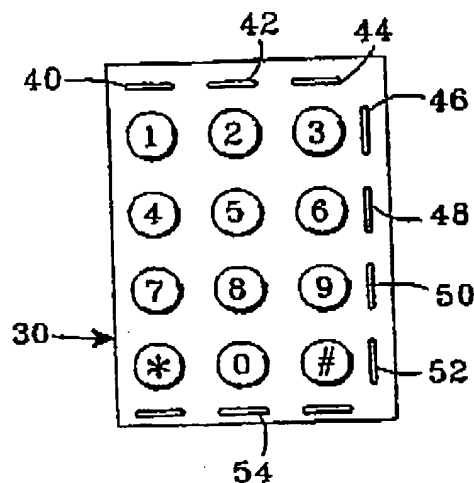


Fig. 3

